

Preludium to Modern Physics : Concepts of the e-Learning Project

L. Drška

drska@antu.fjfi.cvut.cz

CTU, Fac. Nucl. Sci. & Phys. Eng., Dept. of Physical Electronics, Brehova 7, 11519 Praha 1

„You can't engineer tomorrow's solutions on yesterday's technology.“ M. L. Morgan

This paper presents preliminary results of the development of the first part of the courseware for an e-course devoted to fundamentals of modern physics. In the course „Preludium to Modern Physics“ should be utmost employed specific qualities of e-learning process in teaching exact disciplines [1] [2]. Formulation of general concepts of the course and their factual implementation points out **TAB. 1**.

TAB. 1. Preludium : Concepts & Solutions	
General Concepts	Concrete Solutions
Individual approach, customisable contents	Choise of several textbooks, extensive offer of electronic education materials, student search for additional resources
Internationalization, applicability for foreign students	Application of worldwide used textbooks, first class websites, generally used software packages
Interactivity, creativity support, retaining knowledge via interactive problem-solving	Lot of web-based interactive documents, interactive materials in companion websites, just-in-time approach
Access to relevant technical software & computing resources	Several web-based calculators, special Java library for physics, additional sources of Java applets, Matlab / webMathematica
Specific features of knowledge verification	Adequate versions of test programs, graded tests at companion websites, individual microprojects

Global structure of the relevant courseware being developed is outlined in **TAB. 2**. At present, tentative Web version of the Part 1 is available and tested in the courses of modern physics being offered at the FNSPE CTU.

TAB. 2. Preludium : Structure of the Document	
Part 1 (2001)	Part 2 (2002)
Structure of the Microworld	Molecules & Solids
Waves, Particles & Quanta	Nuclear Physics
Quantum Picture of the Microworld	Nuclear Energy & Radiation
Quantum Theory of Atoms	Plasma & Nuclear Fusion
Lasers & Quantum Computing	Particles & Astrophysics
Pocket PC Supplement	

The teaching materials involve several groups of supplementary modules ensuring utilisation of specific distinctions of e-learning ; they are listed in **TAB. 3**.

TAB. 3. Preludium : Supplementary Modules			
Study materials	Textbooks	Suppl. e-texts	Remarques
Working documents	Surveys	Resources	Interactive modules
Tools	Calculators	Constants	Vocabularies
Assignments	Pretests	Exercises	Tests

As fundamental printed material for the course the Czech translation of the excellent, worldwide used Halliday's textbook of physics (Part 5. Modern Physics) is recommended. The courseware is available on the website of the Virtual Department of Physical Sciences and Information Pedagogy, Department of Physical Electronics, FNSPE CTU. Concrete information and relevant URLs displays **TAB. 4**. Direct address of the document „Preludium to Modern Physics (Part 1)“ is given in reference [3].

TAB. 4. Preludium : Textbook and Companion Websites	
Primary textbook (in Czech)	HALLIDAY D.- RESNICK R.- WALKER J.: <i>Fyzika / Physics. Pt 5. VUTIUM / Prometheus, Brno / Praha 2001.</i> http://bear.ro.vutbr.cz/nakl/fyzika/
Course server (in Czech & English)	SERVER VEGA : <i>Virtual Department of Physical Sciences and Information Pedagogy.</i> FNSPE CTU Praha. http://vega.fjfi.cvut.cz
Additional free website (in English)	GIANCOLI D.C. <i>Physics for Scientists and Engineers. Companion Website.</i> Prentice Hall, Upper Saddle River, NJ, 2000. http://cwx.prenhall.com/bookbind/pubbooks/giancoli3/

Full version of the document „Preludium to Modern Physics“ is supposed to be a part of complex e-learning package “Fundamentals of Nonclassical Physics“ (subject of a grant proposal for the year 2002). Selected parts of the package, most eligible for such approach, are planned to be presented in the framework of the integrated management system for education WebCT.

More elaborated and updated electronic version of this presentation will be available on the Web adress given in [4].

References:

- [1] DRŠKA L.: *Komplexní aplikace ICT ve výuce exaktních oborů* . Information and Communication Technology in Education. Proceedings (Ed.: E. Mechlová). University of Ostrava, Ostrava 2001, pp. 121-124.
- [2] DRŠKA L.: *Komplexní aplikace ICT ve výuce exaktních oborů / Complex Application in Teaching Exact Disciplines.* <http://vega.fjfi.cvut.cz/docs/icte2001/>
- [3] DRŠKA L.: *Preludium k moderní fyzice /Preludium to Modern Physics.*
<http://vega.fjfi.cvut.cz/docs/preludium0/>.
- [4] DRŠKA L.: *Preludium to Modern Physics : Concepts of the e-Learning Project.*
<http://vega.fjfi.cvut.cz/docs/w2002/> .